

Notice of Allowability

Application No.

09/683,929

Examiner

Kripa Sagar

Applicant(s)

MAGG, CHRISTOPHER K.

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 2/9/04.
2. ☒ The allowed claim(s) is/are 13-16, 20 and 24.
3. ☒ The drawings filed on 04 March 2002 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

ANGEBRANNDT
PRIMARY EXAMINER
GROUP 1100-1778

DETAILED ACTION

Response to Amendment

1. The amendment filed 2/9/04 has been entered. Claims 1,3-5,8,11-13,16 have been amended; claims 21-24 have been added. No new matter has been introduced. Claims 6,7,10,17-19 have been cancelled. Claims 1-5,8,9,11-16,20-24 are under consideration.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with attorney Kelly Reynolds on 5/6/04.

The application has been amended as follows:

In the claims:

Cancel claims 1-5,8,9,11-12,21-23.

Claims 13-16,20,24 directed to a process are under consideration.

Claim Rejections

3. Claim rejections presented in the earlier office action are withdrawn in view of the amendment.

Allowable Subject Matter

4. Claims 13-16,20,24 are allowed.

The following is an examiner's statement of reasons for allowance:

Independent claim 13 recites a method of making a mask. An opaque(Cr) layer is deposited on a transparent substrate. . A very thin metal layer (2-60nm) is in contact with the opaque layer. A thin photoresist layer (100-200nm) is used to pattern etch the metal layer which in turn is used as a hard mask to etch the opaque layer.

The cited references do not teach the layers used in this manner. Chan teaches a metal hardmask to etch a transparent chrome-oxide hardmask layer coated on a Cr-layer. It uses a thick resist layer (200-500nm). Kornbilt uses two resist layers separated by a hard metallic layer. The lower resist layer is a Si-bearing layer which forms a hard mask while etching. The combination would not lead to the instant invention.

Ultra thin resists (1-100nm) and a hard mask are routinely used in device manufacture as evidenced in IBM technical disclosure NN79054788 ("multi-density mask"; May 1979). It does not teach the thickness of the layers used. Thin EB-resists are conventionally used for patterning photomasks with a conductive layer on or below the resist. The conductive layer is not an etch mask. Japanese Patent JP 86048705 teaches depositing on a glass mask substrate, a Cr layer and a Cr-Cu mixed layer; a thin E-beam resist is used to pattern the mixed metal layer which forms the hard mask for etching the Cr-layer. The thickness of the resist is conventionally less than 200nm. US Pat. 5489489 to Swirbel teaches forming EMI/RFI shields using transparent glass substrates (Fig.3,4). Cr and Cu layers are deposited on the glass. The layers are

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patterned using photolithographic techniques (col.2;lines 30-40). The thickness of the resist layer is not disclosed. The Cu functions as a conductive circuit and is not removed.

The use of thin resists with (conventional exposure techniques and) a very thin hard metal mask in patterning a photomask is unobvious.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

5. Applicant's arguments were considered in determining the allowability of the claims.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 571-272-1392. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MA/ks



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